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ITL.0248

In Re Application Of: James P. Ketrenos et al.

Serial No.
09/466,113Filing Date
December 17, 1999Examiner
Adnan MirzaGroup Art Unit
2141

Invention: Distributed File System Including Multicast Retrieval

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Signature

Timothy N. Trop, Reg. No. 28,994
Trop, Pruner & Hu, P.C.
8554 Katy Freeway, Suite 100
Houston, Texas 77024
(713) 468-8880
(713) 468-8883 (fax)

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Cynthia L. Hayden

Typed or Printed Name of Person Mailing Correspondence

cc:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:

James P. Ketrenos et al

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Art Unit: 2141

Serial No.: 09/466,113

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Examiner: Adnan Mirza

Filed: December 17, 1999
For: Distributed File System
Including Multicast Retrieval

3

Atty Docket: ITL.0248US
P7373

**Board of Patent Appeals & Interferences
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APPEAL BRIEF

Sir:

Applicant respectfully appeals from the final rejection mailed December 11, 2002.

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I. REAL PARTY IN INTEREST

The real party in interest is the assignee Intel Corporation.

II. RELATED APPEALS AND INTERFERENCES

None.

III. STATUS OF THE CLAIMS

Claims 1-24 are rejected. Each rejection is appealed.

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Cynthia L. Hayden
Cynthia L. Hayden

IV. STATUS OF AMENDMENTS

The claims and specification were not amended.

V. SUMMARY OF THE INVENTION

In accordance with one embodiment of the invention, a distributed file system includes multicast retrieval for one or more clients located on a network. A portion of the file system needed by the client at power-on is allocated to a first storage location on the client. A second portion of the file system is then retrieved during runtime operation of the client. This second portion may be retrieved from a server on the network as a multicast operation. The multicast retrieval occurs as a background operation. In other words, a user on the client may run other programs and perform other operations while the multicast operation occurs. The file system remains accessible from the server in response to requests which are not stored in the first or second storage locations of the client.

Turning to Figure 1, in one embodiment of the invention, a file server 10 is coupled to a network 20. One or more clients 12 may be coupled to the network 20 as well. Requests by the client 12 may be made to the server 10, followed by replies by the server 10 to the client 12.

A file system 22 is stored on the file server 10. The file system 22 may be stored on a hard disk drive 8 and accessed by one or more clients 12 on the network 20. See specification at page 3, line 16 through page 4, line 15.

The client 12 may include both a first storage location 24 and a second storage location 26. The first storage location 24 may include any medium which retains stored information after power is removed from the client 12, e.g., a non-volatile medium.

The second storage location 26 may include any medium which may store data during runtime operation of the client 12. In one embodiment of the invention, a system memory 16 is

used as the second storage location 26. System memory 16 is volatile. That is, the data does not remain in the system memory 16 once power is removed from the client 12. Alternatively, however, a non-volatile storage medium, such as a hard disk drive, may be used for the second storage location 26.

In one embodiment of the invention, the client 12 will retrieve some or all of the file system 22 from the server 10. The retrieved file system 22 may then be stored in the first storage location 24 and the second storage location 26. Subsequently, accesses to the file system 22 by the client 12 need not involve the server 10, as will be explained hereinafter.

Looking back to Figure 1, the client 12 also includes a hard disk drive 6, upon which is stored an operating system 34. The operating system 34 may receive requests for the file system 22, from application programs, from the user of the client 12, or from other sources. See specification at page 4, line 16 through page 5, line 17.

Turning to Figure 2, in one embodiment of the invention, a driver 30 performs operations to both distribute the file system 22 and to respond to requests for the file system 22. A driver is a hardware device or program that controls or regulates another device. The driver 30 may control accesses to the file system 22 by the client 12. Further, the driver 30 may control storage of part or all of the file system 22 on the client 12.

In one embodiment of the invention, the driver 30 may distribute the file system to the client 12. The distribution of the file system is made to the first storage location 24 and second storage locations 26 of the client 12.

In one embodiment of the invention, the driver 30 may also respond to requests for portions of the file system 22. The driver 30 intercepts a request from the operating system 34 and searches the first storage location 24 of the client 12 for the requested file portion. If the

requested portion of the file system 22 is not found, the driver then searches the second storage location 26 of the client 12 for the requested portion. Finally, should the requested portion not be stored on the client system 12, the driver 30 retrieves the requested portion from the server 10 located on the network 20.

In Figure 2, the distribution of the file system 22 and the response to requests for the file system 22 are shown as three distinct operations. These three operations may alternatively be performed in combination or may be further subdivided, as desired. The diagram of Figure 2 is meant only to illustrate the distinct functions of the driver 30, not to suggest organization thereof. See specification at page 5, line 18 through page 6, line 17.

A first local store operation 40 may be performed by the driver 30 to store some portion of the file system 22 in the first storage location 24 of the client 12. A second local store operation 42 may be performed by the driver 30 to store some portion of the file system 22 in the second storage location 26 of the client 12. The two operations 40 and 42 distribute the file system 22 to the client, as described above.

A retrieval operation 44 is performed by the driver 30 to respond to requests for the file system 22. In one embodiment of the invention, the retrieval operation 44 is performed once the contents of the first and second storage locations 24 and 26 have been secured, e.g., after the first local store operation 40 and the second local store operation 42 are complete. Once all or part of the file system 22 is locally stored, retrieval from the file server 10 is less likely to be necessary. However, the driver 30 is responsive to requests for the file system 22 regardless of whether any portion of the file system 22 is stored in the first or second storage locations 24 and 26.

During the first local store operation 40, the driver 30 determines the portion of the file system 22 to store in the first storage location 24 of the client 12. In one embodiment of the

invention, the first local store operation 40 is performed the first time the client 12 is connected to the network 20. The first storage location 24 then stores a portion of the file system 22. Because the first storage location 24 is non-volatile, the contents remain available each time the client 12 is powered on. Thus, in one embodiment of the invention, the first local store operation 40 is performed only one time.

To perform the first local store operation 40, in one embodiment of the invention, the driver 30 is available prior to any access of the file system 22 by the client 12. Thus, for example, the driver 30 is loaded prior to a connection by the client 12 to the network 20. In one embodiment of the invention, the driver 30 is stored in the flash memory 14 of the client 12. The driver 30 may thus be run soon after power-on of the client, and accordingly, prior to any connection with the network 20 by the client 12. See specification at page 6, line 18 through page 7, line 22.

The second local store operation 42 also retrieves a portion of the file system 22, this time to be stored in the second storage location 26. In one embodiment of the invention, the second local store operation 42 is a multicast operation to retrieve the file system 22. Further, the second local store operation 42 may be a background operation of the client 12.

Background operations are performed without interaction or involvement of the user of the client 12 and may occur while the user is performing other tasks. By retrieving in the background, even large file systems may be recovered without seriously disrupting the use of the client 12. In one embodiment of the invention, the second local store operation 42 is performed each time the client 12 powers on. See specification at page 7, line 23 through page 8, line 20.

The retrieval operation 44 is any request for the file system 22 by a user of the client 12, by the operating system 34 of the client 12, or by other application software. In one embodiment

of the invention, the driver 30 retrieves the requested data by first scanning the first storage location 24. If not found, the second storage location 26 is scanned for the requested data. Finally, if neither of the storage locations 24 or 26 of the client 12 contain the requested data, the driver 30 retrieves the data from the file server 10 on the network 20.

The driver 30 may “intercept” requests of the operating system 34 or an application program for the file system 22. The driver 30 may thus act as an interface to file system access. In this way, the allocation of the file system 22 to potentially several storage locations may be transparent to the operating system 34, in one embodiment of the invention.

ISSUES

- A. Is Claim 1 Obvious Over Wlaschin in View of Gayman?**
- B. Is Claim 3 Obvious Over Wlaschin in View of Gayman?**
- C. Is Claim 4 Obvious Over Wlaschin in View of Gayman?**
- D. Is Claim 5 Obvious Over Wlaschin in View of Gayman?**
- E. Is Claim 6 Obvious Over Wlaschin in View of Gayman?**
- F. Is Claim 7 Obvious Over Wlaschin in View of Gayman?**
- G. Is Claim 8 Obvious Over Wlaschin in View of Gayman?**
- H. Is Claim 10 Obvious Over Wlaschin in View of Gayman?**
- I. Is Claim 13 Obvious Over Wlaschin in View of Gayman?**
- J. Is Claim 15 Obvious Over Wlaschin in View of Gayman?**
- K. Is Claim 16 Obvious Over Wlaschin in View of Gayman?**
- L. Is Claim 20 Obvious Over Wlaschin in View of Gayman?**
- M. Is Claim 22 Obvious Over Wlaschin in View of Gayman?**

N. Is Claim 23 Obvious Over Wlaschin in View of Gayman?

O. Is Claim 24 Obvious Over Wlaschin in View of Gayman?

GROUPING OF THE CLAIMS

Claims 2 and 17 may be grouped with claim 1.

Claims 20 and 21 may be grouped.

Claims 9, 11, 12, and 14 may be grouped with claim 8.

Claims 10 and 18 may be grouped.

Claims 15 and 19 may be grouped.

VI. ARGUMENT

A. Is Claim 1 Obvious Over Wlaschin in View of Gayman?

Wlaschin fails to disclose a method of “receiving a request for a portion of a file system by a client.” Instead of the claimed method, the cited portion of Wlaschin, at column 7, lines 35-51, involves text data items. Those items are not portions of a file system (i.e., the overall structure in which files are named, stored, and organized. See, Microsoft Press Computer Dictionary, copy of pertinent page attached).

The Examiner admits that Wlaschin fails to disclose determining whether the portion is stored in a second location associated with portions of the file system that were streamed to the client by the server if the portion is not stored in the first location.

Gayman also fails to disclose “determining whether the portion is stored in a second location associated with portions of the file system that were streamed to the client by a server.” Instead, the cited portion of Gayman, column 6, lines 34-61, discloses a multicasting session that

lets multiple client machines download an image file while the image file is still being downloaded to the first client machine.

Gayman does not have anything to do with a portion of a file system or checking for that portion in two different locations on the client.

Therefore, the rejection should be reversed.

B. Is Claim 3 Obvious Over Wlaschin in View of Gayman?

As to claim 3, Wlaschin fails to disclose “associating portions of the file system used by the client during start-up with the first location.” Instead, Wlaschin discloses, at column 10, lines 25-31, reconstructing original data from a read-only partition and ensuring integrity of the system by representing the original data with a unique identification number.

Therefore, the rejection should be reversed.

C. Is Claim 4 Obvious Over Wlaschin in View of Gayman?

As to claim 4, Gayman fails to disclose “associating the second location with portions of the file system that were streamed to the client using a multicast operation.” Gayman at column 6, lines 54-60 discloses sending the image file again during the next cycle to a client machine that missed downloading portions of the image file.

Therefore, the rejection should be reversed.

D. Is Claim 5 Obvious Over Wlaschin in View of Gayman?

As to claim 5, Wlaschin does not disclose “monitoring accesses to a plurality of portions of the file system during start-up; retrieving the plurality of portions from the file system; and storing the plurality of portions in the first location.” Instead, Wlaschin at column 6, lines 24-28

and column 10, lines 58-63 discloses storing a journal partition on the disk, and a library partition and archive partition on the same or different storage devices within the server.

Therefore, the rejection should be reversed.

E. Is Claim 6 Obvious Over Wlaschin in View of Gayman?

As to claim 6, Gayman fails to disclose “retrieving a plurality of portions from the file system using multicasting; and storing the plurality of portions in the second location.”

Therefore, the rejection should be reversed.

F. Is Claim 7 Obvious Over Wlaschin in View of Gayman?

As to claim 7, Gayman does not disclose “waiting for the portion to be streamed to the client if not stored in the second location.”

Therefore, the rejection should be reversed.

G. Is Claim 8 Obvious Over Wlaschin in View of Gayman?

As to claim 8, Gayman does not disclose “a software program that, upon execution: scans a first location associated with portions of a file system that have been previously stored by the system; and scans a second location associated with portions of the file system that have been streamed to the system by a server.”

Therefore, the rejection should be reversed.

H. Is Claim 10 Obvious Over Wlaschin in View of Gayman?

As to claim 10, Wlaschin fails to disclose “the non-volatile storage medium is a flash memory device.” Wlaschin, at column 5, lines 27-31, fails to mention a flash memory device.

Therefore, the rejection should be reversed.

I. Is Claim 13 Obvious Over Wlaschin in View of Gayman?

As to claim 13, Wlaschin fails to disclose “the first location comprises portions of the file system used by the client at start-up.” Instead, at column 5, lines 19-31, Wlaschin simply discloses the components of a computer.

Therefore, the rejection should be reversed.

J. Is Claim 15 Obvious Over Wlaschin in View of Gayman?

As to claim 15, Gayman fails to disclose “the software program, upon execution, retrieves the portion from the server if not stored in the second location.” Instead, Gayman discloses at column 5, lines 50-57, cyclic multicasting of an image file to multiple client machines.

Therefore, the rejection should be reversed.

K. Is Claim 16 Obvious Over Wlaschin in View of Gayman?

As to claim 16, Gayman does not disclose “the contents of the second location are procured as a background operation.” Instead, at column 7, lines 59-67, Gayman discloses noting if the image file needs to be transmitted at a next cycle of the same multicast session.

Therefore, the rejection should be reversed.

L. Is Claim 20 Obvious Over Wlaschin in View of Gayman?

As to claim 20, Gayman fails to disclose “storing instructions that cause the processor-based system to determine whether the portion is stored in a second location associated with

portions of the file system that were streamed to the processor-based system by a server using a multicast operation” and “storing instructions that cause the processor-based system to wait for the portion to be stored in the second location by the multicast operation.” Instead, Gayman discloses, at column 6, lines 38-45, multicasting a copy of an image file to the first client machine, and allowing other client machines to download portions of the image partway through the transmission.

Therefore, the rejection should be reversed.

M. Is Claim 22 Obvious Over Wlaschin in View of Gayman?

As to claim 22, Gayman does not disclose “storing instructions that cause the processor-based system to determine the contents of the first location by monitoring access of the file system during a predetermined time period.”

Therefore, the rejection should be reversed.

N. Is Claim 23 Obvious Over Wlaschin in View of Gayman?

As to claim 23, Gayman fails to disclose “instructions that cause the processor-based system to determine the contents of the first location by monitoring access of the file system during a predetermined time period are executed once.” Instead, at column 4, lines 6-21, Gayman discloses a multicast server application that can create an image file which contains the contents of the complete disk or partition image of the disk for distribution to a group of client machines. Additionally, at column 6, lines 34-45, Gayman discloses that multiple client machines can download an image file partway through the transmission.

Therefore, the rejection should be reversed.

O. Is Claim 24 Obvious Over Wlaschin in View of Gayman?

As to claim 24, Gayman does not disclose “storing instructions that cause the processor-based system to: determine whether the portion will be stored in the second location within an allotted time period; and retrieve the portion from a server if not stored in the second location within the allotted time period.” Instead, Gayman discloses at column 6, lines 45-54, multiple client machines downloading portions of the image file partway through a current transmission cycle of a multicast session.

Therefore, the rejection should be reversed.

VII. CONCLUSION

Applicants respectfully request that each of the final rejections be reversed and that the claims subject to this Appeal be allowed to issue.

Respectfully submitted,

Date:

3/28/03



Timothy N. Trop, Reg. No. 28,994
TROP, PRUNER & HU, P.C.
8554 Katy Freeway, Ste. 100
Houston, TX 77024
713/468-8880 [Phone]
713/468-8883 [Fax]

APPENDIX OF CLAIMS

The claims on appeal are:

1. A method comprising:

receiving a request for a portion of a file system by a client;

identifying whether the portion is stored in a first location associated with portions of the file system that have been previously stored by the client; and

if not, determining whether the portion is stored in a second location associated with portions of the file system that were streamed to the client by a server.

2. The method of claim 1, further comprising retrieving the portion from the server if not stored in the second location.

3. The method of claim 1, wherein identifying further comprises associating portions of the file system used by the client during start-up with the first location.

4. The method of claim 1, wherein determining further comprises associating the second location with portions of the file system that were streamed to the client using a multicast operation.

5. The method of claim 3, wherein associating further comprises:

monitoring accesses to a plurality of portions of the file system during start-up; retrieving the plurality of portions from the file system; and storing the plurality of portions in the first location.

6. The method of claim 4, wherein associating further comprises:
retrieving a plurality of portions from the file system using multicasting; and
storing the plurality of portions in the second location.
7. The method of claim 1, further comprising waiting for the portion to be streamed to the client if not stored in the second location.
8. A system including:
a processor;
a storage medium including a software program that, upon execution:
scans a first location associated with portions of a file system that have been previously stored by the system; and
scans a second location associated with portions of the file system that have been streamed to the system by a server.
9. The system of claim 8, wherein the first location is a non-volatile storage medium.
10. The system of claim 9, wherein the non-volatile storage medium is a flash memory device.
11. The system of claim 8, wherein the second location is a volatile storage medium.

12. The system of claim 11, wherein the volatile storage medium is a memory device.

13. The system of claim 9, wherein the first location comprises portions of the file system used by the client at start-up.

14. The system of claim 9, wherein the second location comprises portions of the file system retrieved using a multicast operation.

15. The system of claim 9, wherein the software program, upon execution, retrieves the portion from the server if not stored in the second location.

16. The system of claim 14, wherein the contents of the second location are procured as a background operation.

17. An article comprising a medium storing instructions that cause a processor-based system to:

receive a request for a portion of a file system by the processor-based system;
identify whether the portion is stored in a first location associated with portions of the file system that have been previously stored by the processor-based system; and
if not, determine whether the portion is stored in a second location associated with portions of the file system that were streamed to the processor-based system.

18. The article of claim 17, wherein the medium storing instructions is a flash memory device.
19. The article of claim 17, further storing instructions that cause the processor-based system to retrieve the portion from a server if not stored in the second location.
20. The article of claim 17, further storing instructions that cause the processor-based system to determine whether the portion is stored in a second location associated with portions of the file system that were streamed to the processor-based system by a server using a multicast operation.
21. The article of claim 20, further storing instructions that cause the processor-based system to wait for the portion to be stored in the second location by the multicast operation.
22. The article of claim 17, further storing instructions that cause the processor-based system to determine the contents of the first location by monitoring access of the file system during a predetermined time period.
23. The article of claim 22, wherein the instructions that cause the processor-based system to determine the contents of the first location by monitoring access of the file system during a predetermined time period are executed once.

24. The article of claim 17, further storing instructions that cause the processor-based system to:

determine whether the portion will be stored in the second location within an allotted time period; and

retrieve the portion from a server if not stored in the second location within the allotted time period.